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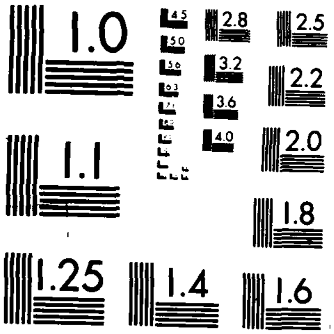
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AIR COMMAND AND STAFF COLLEGE

STUDENT REPORT

AIRCRAFT MAINTENANCE
WARTIME COMMAND AND CONTROL:
THE MIGHT TO FIGHT

MAJOR POLLY A. PEYER 88-2115

"insights into tomorrow"

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Command and control of wartime aircraft maintenance is an extension of peacetime operations; but special activities and the environment demand more of the decision makers. This study looks at the tactical, European scenario and studies 10 of these demands and the roles of four of the primary players in a wing. The study concludes with a "model" command and control picture. Two recommendations are offered: first, this model can be included in Multiple Command Regulation (MCR) 66-5 to expand guidance on wartime maintenance organization and second, that exercises more realistically task units in the area of long-term survivability.

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PREFACE

Tactical aircraft maintenance command and control is organized in a decentralized structure. Multiple Command Regulation (MCR) 66-5, Combat Oriented Maintenance Organization, provides the guidance for tactical maintenance organizations. Most of this guidance applies to peacetime operations, although the philosophy behind the regulation is that transitioning to wartime operations would require little or no changes to the existing structure. There are, however, minor adjustments which must be made to incorporate wartime unique functions such as the battle staff interface.

This study examines the feasibility of developing a model for command and control of tactical aircraft maintenance operating in a wartime European environment. To reach this conclusion, the study analyzes the types of decisions, the decision makers, the environment, and the impacts of centralization or decentralization.

Special thanks goes to Major Phil Miller, who as an advisor, went the extra mile to make sure this analysis stayed on track. Also a thanks to those maintenance officers who took valuable time out of very busy schedules to answer the author's request for comments.

ABOUT THE AUTHOR

Major Polly Peyer is an aircraft maintenance officer who has been in the tactical arena for 10 years. Prior to Air Commmand and Staff College (ACSC), she was assigned to the 36th Tactical Fighter Wing, Bitburg Air Base, Germany. In the three years at Bitburg, she served in four positions within the maintenance complex. Her most recent position was the aircraft generation squadron (AGS) maintenance supervisor where she was responsible for three aircraft maintenance units (AMU), a weapons loading branch, and an air defense alert facility. Prior to this position, she also served as the officer-in-charge (OIC) of an AMU, the equipment maintenance squadron (EMS) supervisor, and the chief of the maintenance operations center (MOC). During her tour of duty in Germany, she participated in 17 exercises and numerous unit deployments. Other assignments include an Air Staff Training (ASTRA) assignment working in the Comptrollers Directorate and in the Directorate for Research and Development; staff officer in the Airborne Warning and Control System (AWACS) logistical division at Headquarters Tactical Air Command (TAC); and maintenance officer at the 67th Tactical Reconnaissance Wing, Bergstrom Air Force Base, Texas, where she was the maintenance control officer, the OIC of an AMU, and the chief of an avionics branch in the component repair squadron (CRS). Major Peyer received her Bachelor of Science Degree in Criminology from Florida State University in 1971, and her Master of Science Degree in Public Administration from the University of Northern Colorado in 1980. She completed Squadron Officer School in residence in 1981 and is a member of the ACSC class of 1988.

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REPORT NUMBER 88-2115

AUTHOR(S) MAJOR POLLY A. PEYER, USAF

TITLE AIRCRAFT MAINTENANCE WARTIME COMMAND AND CONTROL: THE MIGHT TO FIGHT

I. Purpose: To produce a command and control model which depicts wartime decision making in a tactical, European environment.

II. Problem: Peacetime tactical aircraft maintenance organizations are decentralized according to guidance in Multiple Command Regulation (MCR) 66-5, Combat Oriented Maintenance Organization. However, wartime command and control concepts have been developed by individual units. This study analyzes the details and impacts of these different procedures to determine if a common model can be established for wartime command and control of tactical aircraft operating in the European environment.

III. Discussion of Analysis: Under wartime conditions, events and activities will compete for a decision maker's time. To understand how the events and people relate, this study looked at 10 events controlled on the flight line: people, supply, fuels, support equipment, facilities, munitions, communications, transportation, sortie generation, and repair actions. Next, four decision makers' roles were defined. Those people serving in roles of production superintendent, maintenance officer-in-charge, deputy commander for maintenance, and wing commander all perform critical functions in wartime decision making. Furthermore, these people and assets operate under a variety of circumstances, including fighting in-place, deploying to an existing base,

CONTINUED

or dispersing to a separate location. No matter where a unit operates, the command and control relationships could be either centralized or decentralized. In some respects, centralized decision making can be advantageous, especially when assets become critical or if a decision is time sensitive. However, tactical aircraft maintenance philosophies emphasize decentralized control (execution) because it encourages decision making at the level where resources are available. Decentralized control also provides the ability for units to survive if their unit needs to perform in autonomous operations.

IV. Conclusions: A model command and control structure for tactical aircraft maintenance decision making in a wartime European scenario must be simple, flexible, and effective. Such a model is presented in chapter five.

V. Recommendations: This study makes two recommendations. First, a proposal to include the model presented in the conclusion as part of MCR 66-5 with a brief overview providing guidance for units to establish wartime command and control organizations. Second, a plea for more realism in training and exercising, particularly when testing sustainability and endurance beyond the initial thrust of war.

Chapter One

INTRODUCTION

BACKGROUND OF PROBLEM

> I had learned that providing centralized direction from a maintenance control office located remote from the flight line was not the way to go. Though contrary to policy as OMS Commander I had exercised strong authority from the flight line where I knew what was needed and could call for the right help at the right time. I had arrived at Bien Hoa having already developed antipathy toward off-scene decision making and was willing, as Chief of Maintenance, to grant a tremendous amount of latitude to local line chiefs. They recognized my receptiveness to their problems, and we were able to work together quite effectively despite the fractious organizational setup (8:2).
>
> Lieutenant General Leo Marquez
> (USAF, Retired)
> Deputy Chief of Staff,
> Logistics and Engineering
> 1983-1987

Although General Marquez's experience happened in another place--Southeast Asia--and time--20 years ago--the roles and procedures he describes still exist in a "fractious organizational setup." There is a wealth of guidance describing aircraft maintenance organizational structure in Air Force Regulation (AFR) 66-1 and Multiple Command Regulation (MCR) 66-5. Both regulations provide detailed guidance on how to run an aircraft maintenance organization during peacetime operations. Conversely, there is very little reference to wartime command and control operations. Instead, most units depend upon their individual operational plans. What becomes important is previous experience, valuable training, and periodic exercises. Practicing wartime decision making helps create a common sense approach to meeting adversities. What this means is decision making and command and control functions may vary from unit to unit or even person to person. The possible negative "fractious" impact of individualized command and control structures begs the question to be asked if written guidance for wartime command and control of aircraft maintenance would make decision making more efficient, accurate, and quicker.

OBJECTIVES

In this quest for more efficient command and control, the overall purpose of this study is to determine if a "model" command and control system could be developed for an Air Force wing level tactical European wartime environment to monitor and direct aircraft maintenance activities. In studying this problem, four objectives were analyzed in a building block approach to the problem. Chapter Two is an in depth look at the first two objectives: describing the types of decisions made during wartime operations and defining the levels and roles of decision makers in a tactical wing. The objective in Chapter Three is to differentiate between different types of organizational structures and determine their commonalities. Lastly, Chapter Four discusses the advantages of both centralized and decentralized command and control. The results of this study in Chapter Five will be provided to the Logistics Concept Branch at the Air Staff to be included in a larger study of command and control at higher levels.

SCOPE OF THE STUDY AND DEFINITIONS

The scope of this study included reviewing existing regulations, operational plans, and after action reports to combine common ideas about aircraft maintenance command and control under wartime conditions. Interviews were also collected from in-the-field maintenance officers to get a cross-section of how units currently do business. The analysis was specifically limited to a tactical organization operating in a European wartime environment.

To understand what is meant by tactical, European, wartime environment, there are a few terms which need to be defined before proceeding. So the author and reader are talking the same language, the following definitions are offered.

Command and Control - as defined in Joint Chiefs of Staff Publication Number 1 (JCS Pub 1) is

> the exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission (14:77).

Although this is a standard definition, it can be applied to any level of operation. For the sake of this study, the command and control functions deal with a wing commander (Wg CC) through the deputy commander for maintenance (DCM).

Battle Staff - is defined as the decision makers in a wing who assemble in the command post during increased readiness. In Europe, USAFER 55-16 gives the following guidance:

> The unit commander determines the operations battle staff composition. Command post battle staff positions include (1) Senior Battle Staff consisting of the wing commander and selected members of the decision making staff such as: deputy commanders for operations, maintenance, and resource management; combat support group commander; security police group commander; and hospital commander. (2) Operations Support Battle Staff . . . including a maintenance operations function. (3) Survival Recovery Center is determined by the commander but recommended manning includes representatives from disaster preparedness, medical services, civil engineers, and personnel (11:30-31, para 7-5).

The battle staff operates from a hardened facility also referred to as the wing operations center (WOC). For survivability, most units also duplicate these functions in an alternate facility by assembling the vice commander and assistant deputy commanders.

Tactical European scenario - is defined by the author as

> the United States Air Force units positioned in, or deployed to, Germany and England which perform air defense, counter air, interdiction, and defense suppression missions. These forces include F15, F16, F111, and F4 aircraft. In this study, the close air support (A-10) role is not included.

The European nature of this scenario assumes the characteristics of the North Atlantic Treaty Organization (NATO) since operational command authority comes from NATO sources. At times, the NATO scenario can also include further dispersal of US forces to bases other than Germany and England.

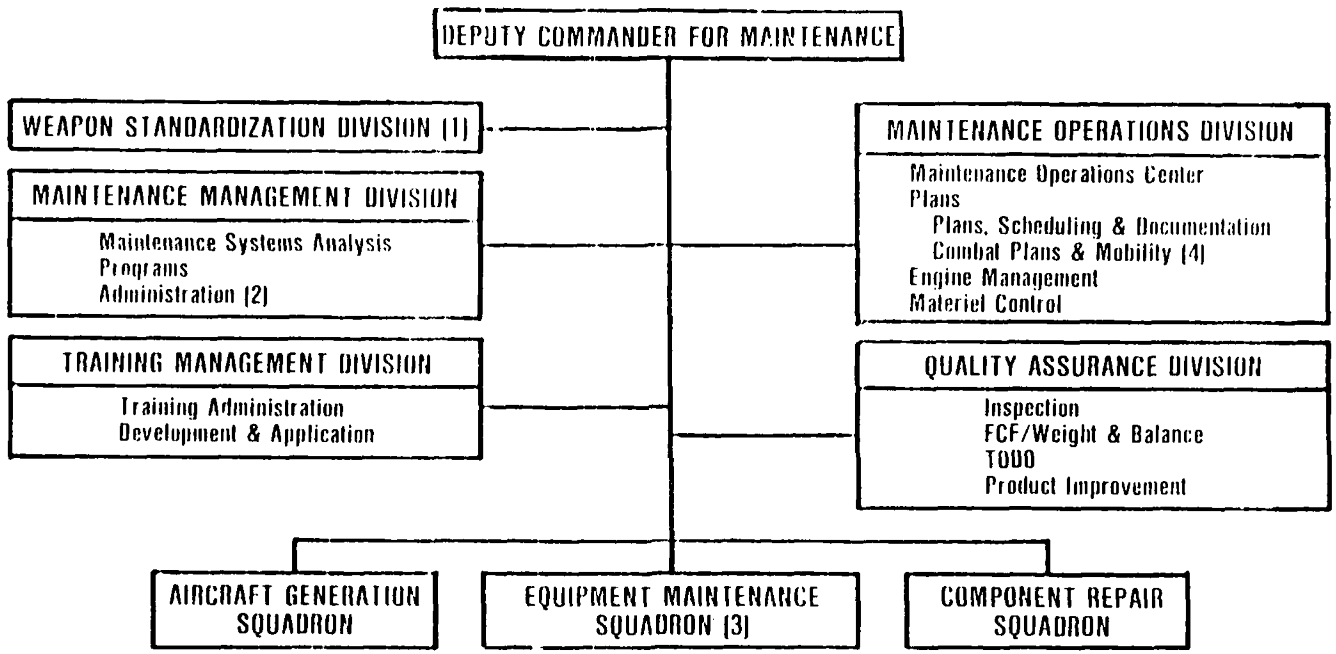
Maintenance Organizational Structure - is described in MCR 66-5, Combat Oriented Maintenance Organization (COMO), as a

> tactical aircraft maintenance support structure with the mobility and flexibility to survive in a dispersed environment and sustain combat operations. This organization is required to provide the necessary capability for decentralized, small unit autonomy during dispersed operations (13:1-1).

To gain a broader perspective of the typical maintenance organization, see Figures 1, 2, and 3 which were extracted from MCR 66-5 (13:1-6 - 1-8).

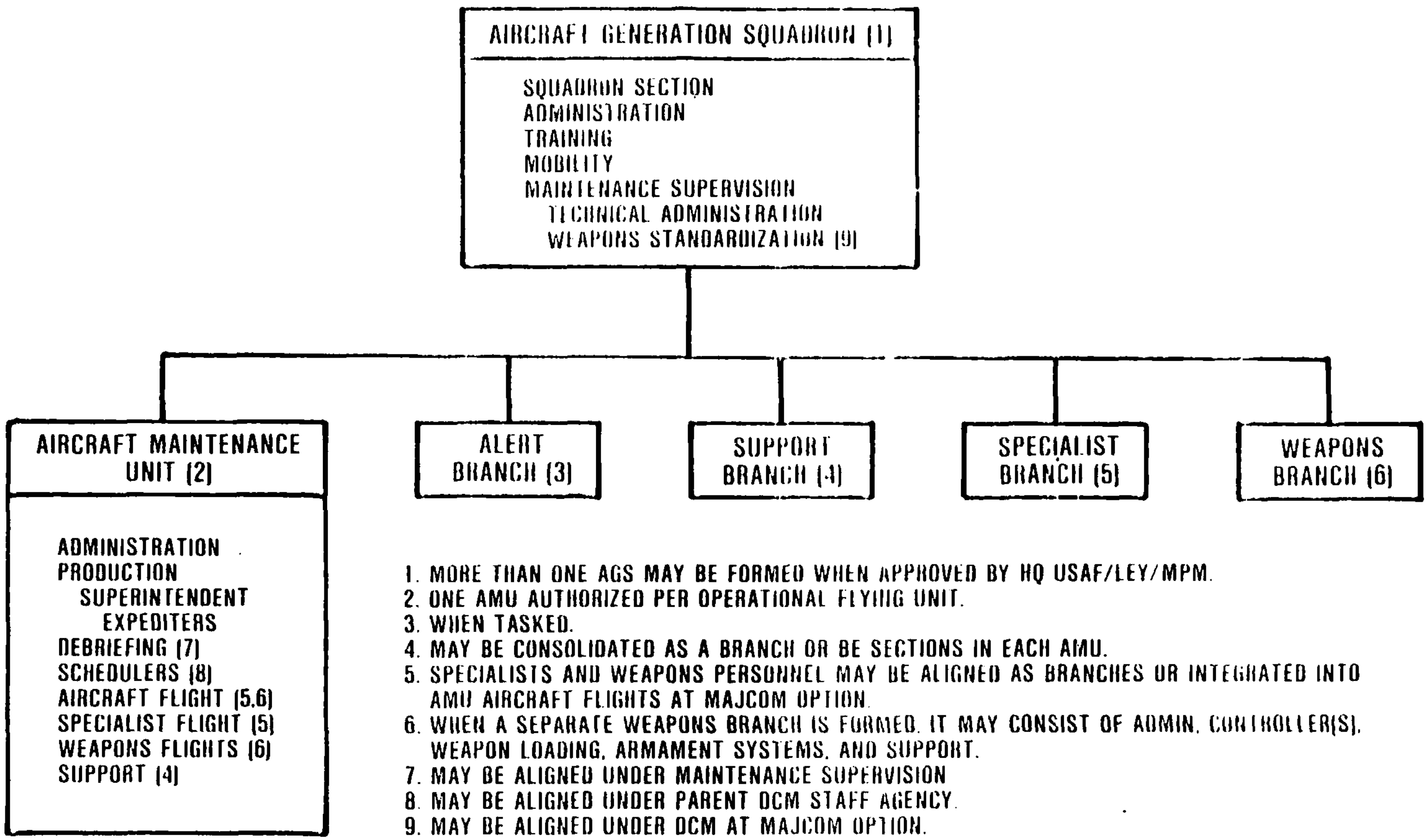
Integrated Combat Turnaround (ICT) - is defined in MCR 66-5 as

> a simultaneous cold refueling/defueling with aircraft engines shutdown, munitions loading or unloading, and other specified maintenance activities (13:7-1, para 7-3f).



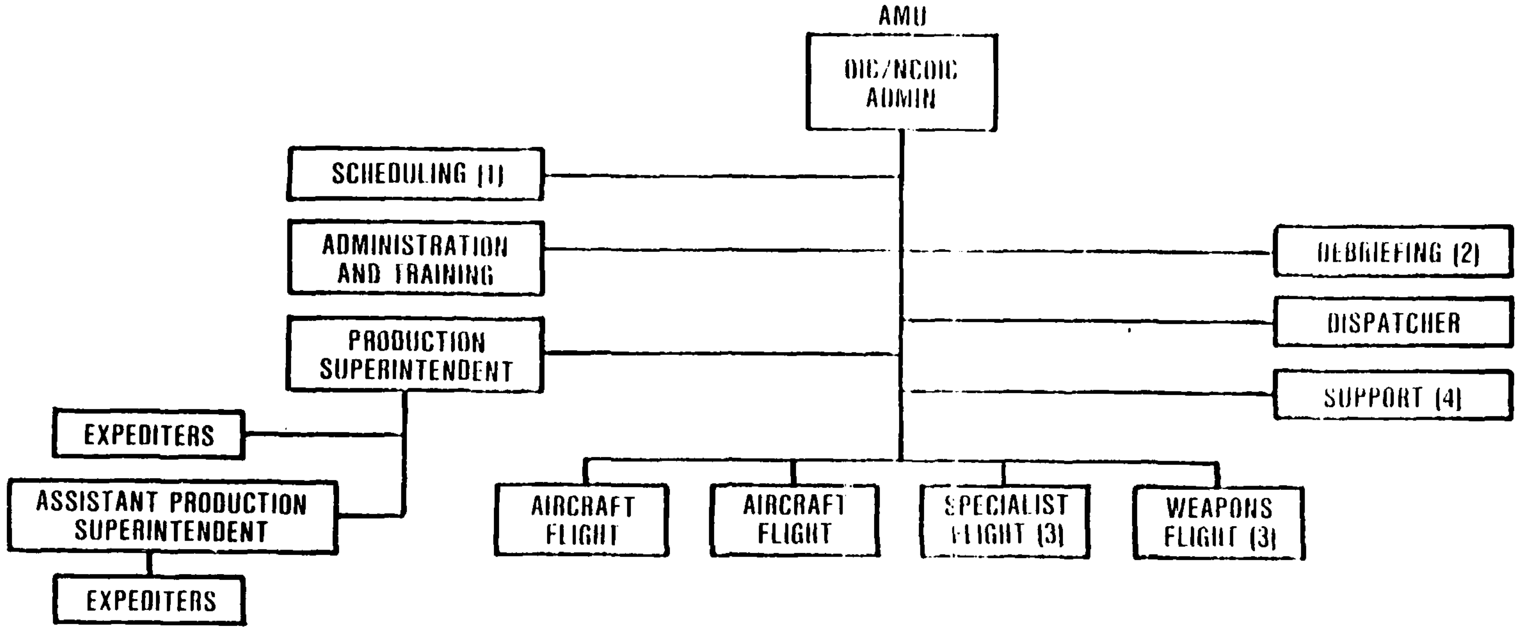
1. MAY BE ALIGNED UNDER AGS MAINTENANCE SUPERVISION AT MAJCOM OPTION.
2. MAY BE ALIGNED DIRECTLY UNDER THE DCM AT MAJCOM OPTION.
3. MAY BE CONSOLIDATED WITH COMPONENT REPAIR SQUADRON AT MAJCOM OPTION.
4. MAY BE ALIGNED IN MAINT MGT DIV AT MAJCOM OPTION.

Figure 1. Deputy Commander for Maintenance Organization
Source: MCR 66-5/C1 31 May 1985



1. MORE THAN ONE AGS MAY BE FORMED WHEN APPROVED BY HQ USAF/LEY/MPM.
2. ONE AMU AUTHORIZED PER OPERATIONAL FLYING UNIT.
3. WHEN TASKED.
4. MAY BE CONSOLIDATED AS A BRANCH OR BE SECTIONS IN EACH AMU.
5. SPECIALISTS AND WEAPONS PERSONNEL MAY BE ALIGNED AS BRANCHES OR INTEGRATED INTO AMU AIRCRAFT FLIGHTS AT MAJCOM OPTION.
6. WHEN A SEPARATE WEAPONS BRANCH IS FORMED, IT MAY CONSIST OF ADMIN, CONTROLLER(S), WEAPON LOADING, ARMAMENT SYSTEMS, AND SUPPORT.
7. MAY BE ALIGNED UNDER MAINTENANCE SUPERVISION
8. MAY BE ALIGNED UNDER PARENT DCM STAFF AGENCY.
9. MAY BE ALIGNED UNDER DCM AT MAJCOM OPTION.

Figure 2. Aircraft Generation Squadron Organization
Source: MCR 66-5 15 September 1983



(1) MAY BE CENTRALIZED UNDER THE APPLICABLE DCM STAFF FUNCTION. SCHEDULER MAY REMAIN ASSIGNED TO THE APPLICABLE DCM STAFF FUNCTION WHETHER CENTRALIZED OR DECENTRALIZED AT MAJCOM OPTION.

(2) MAY BE CENTRALIZED UNDER MAINTENANCE SUPERVISION.

(3) MAY BE CENTRALIZED IN THE APPROPRIATE SPECIALIST OR WEAPONS SERVICE BRANCH.

(4) MAY BE ALIGNED IN THE AIRCRAFT MAINTENANCE UNIT AS A SECTION, AS A SEPARATE BRANCH.

Figure 3. Aircraft Maintenance Unit (AMU) Organization
Source: MCR 66-5 15 September 1983

METHODOLOGY

For the first two objectives in Chapter Two, the author reviewed regulations, interviewed DCMs both overseas and in the continental United States (CONUS) by requesting the information shown in Appendix A, and drew from personal experience. The objectives in Chapter Three came from the same sources as in Chapter Two but also included inputs from the headquarters staffs at Tactical Air Command (HQ TAC) and United States Air Forces Europe (HQ USAFE). The objective in Chapter Four is also a combination of perspectives and the recommendations from the Salty Demo exercise held in May 1985, at Spangdahlem Air Base (AB), Germany. The final product in Chapter Five is a synthesis of the inputs and a starting point for possible follow-up studies in this area.

ASSUMPTIONS AND LIMITATIONS

There are three basic assumptions the author makes in preparing this study. First, the reader has a basic understanding of aircraft maintenance requirements and procedures. Beyond the overview describing the peacetime maintenance organizational structure, the reader should possess at least a conceptual knowledge of the guidelines in MCR 66-5. The second assumption is all of the theories and observations in this study apply only to a tactical, European environment. This is not to say that some of the concepts may not exist in other theaters such as in the Pacific or other units with similar missions. However, since these environments were not analyzed, the results of the study can only be discussed in terms of the defined environment, namely, a tactical, European scenario. A final assumption is the reader recognizes the author's experience in the aircraft maintenance field. As a field grade officer with 10 years working knowledge of the tactical forces at wing and major command headquarters, the author has served at CONUS and overseas bases. During these assignments, the author held positions in all three of the maintenance squadrons and also performed duties in the WOC.

There are three limitations which should also be considered as the reader studies this product. To begin with, the author found no previous studies on this problem. Many works have been written addressing command and control from the macro-management level. Also, there are readings on the C3 (command, control, and communications) issues which advocate sophisticated hardware and equipment. This made research difficult in terms of finding tested and proven hypotheses. As a result, much of the information is opinion from experienced, knowledgeable sources. A second limitation is related to time and distance. Under optimum research circumstances, the author could have gained more valuable insights if visits to a variety of units were possible. This wasn't the case. Many of the conclusions were based on written inputs from the field and the author's own previous observations. The last limitation is something that plagues all "Project Warriors"--we're never sure if our simulations of wartime contingencies are realistic or not. All the well-intentioned theorizing and practicing may be unrelated to the next war we fight--let's hope we never have to find out.

Chapter Two

WHO CONTROLS WHAT?

This chapter will describe the types of decisions about assets and resources made during wartime operations and will define the key players making these decisions. In describing the relationship between who makes what decisions, the picture presented here is a cross section among ideas offered by three CONUS and five overseas maintenance units. This chapter is in two parts: first, a look at the assets controlled on the flight line, and second, a discussion of the decision makers. The discussion on assets controlled in a tactical, wartime scenario includes people, supply parts, fuel, support equipment, facilities, munitions, communications, transportation, sortie generation factors, and repair actions. In an article he wrote for Air University Review, Major Stephen Hall reminds the reader that "hundreds of complicated tasks must be properly orchestrated to accomplish the mission" (3:42). The discussion of decision makers will look at the orchestrators in their roles of production superintendent, the officer-in-charge of maintenance, the DCM, and the Wg CC.

ASSETS

This brief description of flight line assets will cover 10 of the most critical resources. To produce one sortie, or 101 sorties, these and a myriad of other actions must take place. A discussion on each of the 10 assets will include a description, possible problems, and solutions.

People

The most critical resource any leader has are people. Most aircraft maintenance units (AMU) have over 250 technicians who are highly specialized in 12-15 different career fields. However, as an outcome of the 1984 Project Rivet Workforce, a new specialty classification code became effective in March 1987. Rivet Workforce takes 43 maintenance specialties representing different aircraft and systems and broadens their skill requirements (2:20). When completely implemented in 1989, the maintenance workforce should be "more mobile, flexible, and survivable" (4:13).

The biggest problem in wartime is attrition. Even given the increased flexibility of more general maintenance skills, as war progresses the number of available people will dwindle. The Salty Demo exercise in May 1985, at Spangdahlem AB, Germany, resulted in a 33 percent casualty rate (9:21). Numbers of aircraft will also decrease, and the challenge is to keep an effective mixture of different skills capable of generating aircraft.

Solutions to personnel attrition include dispersal, duplication of skills, and use of protective equipment. Strategically locating troops by dispersal and keeping control of them is necessary for survivability and accessibility. The technicians must also become skilled at performing not only aircraft related tasks, but also basic survival tasks such as emergency medical assistance and ground base defense from terrorists, Spetsnaz, or regular forces. Proper use of protective equipment such as chemical masks, suits, and shelters becomes a necessity.

Supply

Parts are closer to the fighting unit than ever before. Under the USAFE program called Dedicated Aircraft Supply Support (DASS), most assets such as bench stock, "black boxes," and mechanical/hydraulic parts are now collocated with an AMU. This increases the self-sufficiency of the AMU as never before.

Problems which may be associated with management of supply parts include storage, accountability, and movement of these parts. Hardened facilities are not always available for storage. USAFER 60-6, Combat Sortie Generation, emphasizes the need for "sufficient hardened critical assets storage facilities in close proximity to the CTA (Combat Turn Area)" (12:6-3, para 6-3e(9)(b)). Troubles may surface in accounting for the parts. In a wartime scenario, we usually consider the supply computer inoperative and many times telephone lines have also been damaged. Cross-utilization of assets among AMUs becomes difficult. Moving the parts from one section to another may become difficult if the base is under attack.

As shortages occur, possible solutions include cannibalization of components between aircraft, minor repairs, and cross-utilization. MCR 66-5 defines cannibalization as the "removal of a specific. . . part from one weapon system. . . for installation on another end item. . . with an obligation to replace the removed item" (13:A2-1). Aircraft cannibalization is an age-old solution and most maintainers resort to this action rather easily. Technicians can also make "temporary fixes" on many mechanical parts. The real key to parts problems though, is to have a system to query other locations to find the proper assets and have a distribution system for delivery and movement of assets among AMUs.

Fuels

Refueling aircraft during a wartime environment often becomes the chokepoint in an Integrated Combat Turnaround (ICT). There are usually two methods of refueling available to the flight line, and on a selected number of bases, a third capability exists. The most commonly used method is refueling by truck, usually accomplished inside a hardened aircraft shelter (HAS) or at the aircraft parking spot. The second method, hot pit refueling, is the "transferring of fuel into aircraft fuel tanks with one or more aircraft engines operating" (15:40). The third method, not widely available, is the pantograph (pipeline) refueling system installed inside a HAS.

Many problems may occur during refueling. In his 1987 Air Command and Staff College (ACSC) research project on refueling systems, Major David Nakayama, highlighted the following problems (15:viii):

Trucks: limited capacity, long turnaround time, fuel vapors, noisy
Hot Pit: congestion of location, air attack vulnerability, safety conditions with ignition source while engine running
Shelter Pantographs: fixed, lack of mobility, dependent on source (pump house)

Other problems which can occur include contamination of fuel, blocked access routes, or destruction of supply source.

In solving critical refueling problems, the decision maker must have accurate, timely information to weigh the immediate pros or cons of using one system versus another. USAFER 60-6 suggests having the "fuels control center [or a representative] collocated with the Combat Turn Director" (12:6-6, para 6-5l[10]). These decision makers consider factors such as: number of aircraft that need refueling, amount of fuel required, number of trucks available, vulnerability of base to impending attack, and condition of taxiways and runways (congested or unuseable). As time is a valuable commodity in wartime, it is also important to know the average refueling times. For tactical aircraft, the average truck refueling takes 12-14 minutes, hot pits take 5-7 minutes, and HAS pantographs take 6-8 minutes (15:11-12). Knowing the capability of these systems allows the decision maker to work around the myriad of problems which can surface.

Support Equipment

Support equipment runs the gamut of various pieces of Aerospace Ground Equipment (AGE) needed to launch the aircraft, load munitions, or repair the aircraft. In a combat scenario, each AMU usually has a predetermined quantity of a variety of AGE. In the author's estimate, there may be as many as 190 items for flight line use, depending on the particular type of aircraft being supported. Additionally, to support troubleshooting and repair, another 40-50 pieces of test equipment are required.

The problems in managing such a volume of equipment include knowing locations and serviceability; tracking attrition or damages; making sure assets are refueled, serviced and maintained; and ensuring assets are protected from attacks. AGE not properly controlled can delay maintenance actions if technicians cannot locate an asset or if one is delivered which does not work properly. Similarly, AGE which is destroyed or damaged in attacks must be identified and repaired. Refueling, servicing, and maintaining AGE become complex tasks because fuel and cryogenic (low temperature refrigerants used to manufacture liquid oxygen and nitrogen) production is centrally located, and carts must be delivered periodically for servicing. Protecting assets from attack becomes a problem because of the necessity to move equipment in the open.

Solving the problems associated with managing AGE include using a coordinated effort of people, communications, and timely decision making. The movement of AGE is done by special teams of specialists from the equipment maintenance squadron (EMS). These movements are coordinated through radio communications and should be carefully tracked on status boards by the mover and other production superintendents. Directing movement of AGE during imminent attacks is risky. Safer timing for movement would be during darkness, using alternate routes.

Facilities

European airfields are quite different from the open ramp aircraft parking in the CONUS. Aircraft operate out of HAS facilities which protect aircraft, people, and equipment. USAFER 60-6 requires units to "perform combat turnarounds in hardened aircraft shelters to maximum extent possible . . . procedures should minimize shelter exposure time and not require large concentrations of exposed critical support assets" (12:6-1, para 6-1b).

The problems the AMUs encounter as they control HAS facilities include aligning aircraft priorities, damages or losses, and power shortages. Even at the beginning of the war, most units do not have a HAS for each aircraft. HASs also house other critical assets such as engines, spare parts, support equipment, and command centers. As the war progresses, shelters are damaged or destroyed and sometimes inaccessible because taxiways or runways are blocked. In a study on air base survivability in Europe, Major Stephen Hall calls the runways and taxiways "the Achilles' heel of launch and recovery" (3:37). Another problem is the high probability of power outages. HAS doors use electricity and power failures can be disastrous if they prevent mission capable aircraft from exiting for launch or from recovering after flight.

Tackling facility problems can be a hair-pulling experience. To provide maximum aircraft protection, the decision makers play a "shell game" to direct incoming aircraft into HASs where launching aircraft have just left. Most units divide the HASs into areas which represent clusters where different types of maintenance are accomplished. To cope with runway and taxiway damage, one Salty Demo supervisor suggested "CE [civil engineers] should provide a heavy equipment operator and bulldozer to each AMU. The AMU knows what holes need to be filled first. It does no good to have a runway open only to find you can't taxi to it" (19:--). Working around power outages can be a tough problem to solve, but most shelters have back-up generators which provide alternate power source about 5-10 minutes after the outage occurs. In the interim, the aircraft doors can be mechanically opened using steel cables and a tow vehicle.

Munitions

Depending on the unit mission, the munitions assets in NATO represent a wide variety of capabilities. The assets are usually maintained in a secure storage area controlled by EMS during peacetime and then a portion of the inventory is dispersed to the flight line during early phases of the war. As munitions are expended, EMS replenishes the flight line.

Three problems complicate munitions management: safety, resupply, and accountability. The stress and hectic environment of combat can detract from safety standards. Working in chemical warfare suits with masks is cumbersome and requires a high degree of proficiency, and the environment inside a HAS is noisy, dimly lit, and filled with exhaust fumes. Resupply becomes a vulnerable linchpin. Since "munitions must be assembled at distant sites and transported to the flight line," availability is highly dependent on the accessibility of roads to and from the storage area as well as survivability of vehicles and delivery crews (3:39). Accountability becomes a problem as the expenditure of munitions increases, and the information regarding types and quantities of used weapons may be inaccurate.

To solve munitions problems, the maintenance decision maker needs to establish procedures. To maintain safety conditions, people must practice with as much realism as possible. Practicing without chemical masks or leaving HAS doors open only satisfies a peacetime attempt to alleviate discomforts. Munitions dispersal helps solve resupply difficulties. Most bases use the same practice as Spangdahlem AB which makes sure "the prepositioning of one or two standard munitions loads [is] accomplished at every shelter possible" (19:--). Weapons should be delivered to the flight line using a "push" system which brings assets on a continuing basis instead of waiting for a request. With a rotating delivery system accountability becomes essential. An accurate count of munitions should include assets wherever they might be: in the storage area, in the delivery cycle, prepositioned in HASs, or loaded on aircraft. Debriefing after a flight must be accurately relayed so records can be adjusted with expended munitions.

Communications

Much of the flight line communications is done over the intrabase radio network on hand-held radios. Supervisors in the AMUs can talk with each other, the WOC, the munitions storage area, the operations squadron, or among AMUs. Telephones with the traditional four-digit and a more direct three-digit system interlinking HASs and the WOC are also heavily used.

Problems with radios and telephones reduce their efficiency. In a 1986 Project Relook report, the Air Force Logistics Management Center (AFLMC) identified communications problems in the wartime European environment. Their assessment was that "communication and transfer of logistical information will, at unpredictable times, be virtually impossible due to a combination of attack damage and saturation" (17:2). Four of the most common problems are radio saturation or busy telephone lines; range limitations; communications security (COMSEC); and enemy disruption or "jamming" of frequencies. If these problems occur, "command and control of the maintenance force will become more difficult and can easily break down" (5:24). In a testimonial to communications, Kurt Arbenz and John Marrio write "unreliable communications mean a loss of credibility in information passed to the next command level below or above. Without credible information, the commander cannot make timely decisions in a crisis" (1:10).

Problems with secure, survivable communications equipment require long term, expensive solutions. In the interim, to deal with saturation, decision makers need to rank order their requirements and communicate only essential information. Using a timed transmission sequence helps reduce the network traffic jam. To help with range problems, radio batteries must be charged and antennas installed in HASs. To reduce COMSEC violations, some units have devised simple matrix systems which use reference codes to transmit the needed information or requests. To cope with enemy disruption to frequencies, most units have designated alternate methods of communication.

Transportation

The flight line quickly becomes a freeway of special purpose vehicles representing anything from pick-up trucks to 50-ton cranes. These vehicles are especially designed for aircraft towing, munitions loading, delivering fragile supply assets, moving AGE, and transporting people.

Problems associated with vehicles include refueling, servicing, accessibility, and attrition. Most bases have central fuel and servicing points located off the flight line. Driving routes, roads, and taxiways may become damaged and prevent vehicles from making this trip. Also, damage from ground or air attacks may reduce availability of one-of-a-kind assets.

Solving these problems requires common sense. Decision makers must take advantage of slack time and direct vehicles to the servicing point whenever possible, not when the need is critical. Dispersing vehicles and using them for multi-purposes also increases flexibility. Also, the decision maker needs to establish close coordination with the transportation control center, which under USAFER 60-6 is responsible for repairing and managing mission essential vehicles (12:6-6, para 6-5e). Additionally, "every vehicle on the flight line should have a few litters and bandages. . . they will be the first to respond to injuries on the flight line" (19:--).

Sortie Generation

Under this category is a wide variety of special taskings and response efforts including combat turns, airfield recovery, and ground defense. USAFER 60-6 provides "the command procedures on planning, support, and execution of combat sortie generation" (12:6-1, para 6-1a). Tactical aircraft are prepared for the next sortie using an ICT concept. Airfield recovery starts with base protection actions and continues through Base Recovery After Attack (BRAAT) procedures. Ground defense includes security measures and base denial efforts.

Problems in these taskings are a product of time and resources. Things happen quickly and time is the enemy as ICTs take 50 minutes and airfields need to be operational immediately after attack. In the Salty Demo exercise, the evaluators noted that "sortie generation waited on BRAAT, i.e., the mission was at a standstill until key BRAAT activities were completed" (9:C-49). Resource management is crucial as people and equipment become destroyed or damaged. Salty Demo clearly demonstrated the need to "limit damage and ensure the survival of command and control capabilities" (9:1-1).

Thorough planning and repeated practice are the solutions. ICTs need to be precise. "When a smooth-flow program is being used, returning aircrews report their maintenance status and are directed to the area where they can be immediately turned. . . or sent to an area where repairs can be made" (5:25). Likewise, BRAAT reporting requires procedures for relaying information through proper channels to the Survival Recovery Center (SRC). Base denial and ground defense options need to be well understood before the threat presents itself. Salty Demo recommended that "improvement in command, control, and communications are absolutely necessary" if sortie generation was to be timely and successful (9:C-49).

<u>Repair Actions</u>

This category of decision making includes the determination of which repair actions come first. Preventive maintenance and inspections are factors, as are "quick fix" and aircraft battle damage repair (ABDR). ABDR is a new concept in which technicians are trained to make essential repairs to get an aircraft back into combat quickly. It may mean the aircraft will be restricted from certain flight maneuvers or it may not have all of its systems operable (7:13).

When faced with a problem to support a quick repair versus a lengthy one, the decision maker may find the lack of some resources and availability of others are the deciding factors. People skills and availability become sensitive. Supply assets may not be available. Support equipment could be damaged. Facilities may have been destroyed. All of these are problems demanding attention.

The solutions a decision maker has available are the same resources which create the problem. People can be cross-trained, supply parts can be cannibalized between components, support equipment can be cross-utilized, and temporary facilities may suffice. The ABDR concept makes a radical break from the existing maintenance philosophy in which repairs had to conform to specifications (7:15). Putting together the repair capability "gives commanders another asset to use in battle. . . even if they only need it to make one more flight" (7:14).

<u>DECISION MAKERS</u>

Although every person in the war will be a decision maker at some level, this discussion focuses on the roles of four specific levels. These people make most of the decisions regarding the assets discussed earlier in this chapter. From the bottom up, the production superintendent, the maintenance OIC, the DCM, and the Wg CC all filter information. The following discussion will show how they interrelate.

Production Superintendent

The production superintendent is a senior non-commissioned officer (NCO) on the flight line making on-the-spot decisions. This calls for a troubleshooter who spot checks progress of maintenance and responds to immediate requests for assistance. Working for the production superintendent is a combat turn director (CTD) who controls teams performing sortie generation and ICT tasks. The production superintendent allocates resources among the teams to balance capability and keep the maintenance priorities on track. In addition to ensuring sortie generation flows quickly, the production superintendent also oversees lengthy repairs, reports on ABDR progress, monitors facility and access route damages, keeps support equipment properly allocated, and assists with establishing fuel truck priorities. The production superintendent informs the OIC, DCM, or Wg CC where potential problems may arise. The production superintendent usually cannot solve the problems alone, but a key element of their job is to assess the situation and dispatch the needed assistance. The production superintendent must keep moving on the flight line and anticipate the next requirement.

Officer-In-Charge

The AMU officer-in-charge (OIC) becomes a liaison among the tactical fighter squadron (TFS), the WOC, and the flight line. The OIC works with the TFS to match aircraft to pilots and satisfy sortie requirements. Some units have the OIC collocated in a hardened facility with the TFS. Other units have the OIC in a vehicle with a TFS liaison. In working with the WOC, the OIC assesses the overall flight line status and passes information to the DCM. This information is not detailed, but rather an assessment of capabilities. The OIC also works on the flight line to redirect AMU resources such as people or equipment, give guidance to the production superintendent, and coordinate with other AMUs or squadrons to share resources. Some units have an intermediary aircraft generation squadron (AGS) supervisor between the OIC and the DCM. This individual allocates resources among AMUs or squadrons, and elevates the problems to the DCM which exceed the flight line capability.

Deputy Commander for Maintenance

The DCM operates either in the WOC or is mobile on the flight line. As part of the battle staff, the DCM keeps the Wg CC advised of the maintenance status and "show-stopping" problems. The DCM helps solve problems beyond the capability of the maintenance squadrons and coordinates with the other battle staff members. The Relook report emphasizes that "information regarding needs, positioning of resources, consumption, and base operability must be instantly available to decision makers. Likewise, decisions and priorities must be rapidly transmitted to those able to react" (17:3). The type of information ranges from changes in priorities to imminent attack warnings. The DCM is supported by controllers who monitor the AMU radios and track aircraft status. Their location varies according to base plans. Some units collocate them in the WOC, others position them in their peacetime maintenance operations center (MOC) while others disperse them into the hardened TFS facilities.

Wing Commander

The wing commander's role in maintenance decision making is the most indirect. As the Wg CC assesses the threats and appropriate base responses, the Wg CC transmits the "big picture" to the DCM. In this decision making role, the Wg CC must understand the capabilities and limitations of maintenance and other logistical functions. If the commander directs special taskings such as a mass launch or an increased sortie utilization rate, knowledge of the status of aircraft maintenance becomes very important. The commander's decisions drive other decisions all through the chain of command. In an article he wrote for Signal, General Otis summarized the commander's role by saying "Commanders will not be running a push-button war. War remains a human activity, and the commander's intuition, savvy, daring, and bravery will remain essential" (6:19). A former USAFE wing commander, Colonel Clifford Krieger, was even more descriptive by stating the wing commander's "primary effort is focused on generating combat sorties in the numbers and at the times required. The wing commander must [also] ensure that he has a secure base from which to fight and that he is getting the best from the available logistic support in executing his tasking" (5:21).

SUMMARY

This chapter describes those assets which are controlled and the decision makers who have command over them. Command and control in the tactical European wing is essential. With the myriad of resources available and the layers of supervision used, procedures must be established before the war to delineate how to control the assets such as people, supplies, fuels, support equipment, facilities, munitions, communications, transportation, sortie generation factors, and repair actions. The functions of the production superintendent, OIC, DCM, and Wg CC must be clearly stated to avoid overlap while keeping timely, accurate information flowing up or down to the proper decision making level. Lieutenant General Marquez, who recently retired as the Deputy Chief of Staff of Logistics and Engineering, had a "long-held belief that the flight line--where the action is--is also where resources, responsibility, and authority ought to congregate" (8:2). Command and control procedures are the critical ties which appropriately determine "who controls what." The next chapter will look at three different scenarios to identify the commonalities or differences between centralized and decentralized decision making structures.

Chapter Three

WHEN ARE DIFFERENT COMMAND AND CONTROL STRUCTURES EFFECTIVE?

In this chapter, three different European tactical scenarios will provide the basis for an analysis of the effectiveness of centralized versus decentralized command and control of flight line aircraft maintenance. Depending on the unit's taskings which are outlined in the War Mobilization Plan (WMP), units may be committed to either fight in-place, deploy to an existing base, or deploy to a dispersed location where existing base support does not exist. Most of the European units will fight in-place or send small numbers of aircraft and people to dispersed locations if and when necessary. Stateside units usually split their deployments to both an existing base in Europe, and to a location where facilities and equipment are prepositioned but an organizational infrastructure has not been established.

FIGHT-IN-PLACE

Those units which are permanently located in USAFE make very few changes before they begin wartime operations. They are governed by Operational Plans (OPLANs) 4102 and 4409 which describe wartime taskings and sortie utilization rates. Each unit also has an Emergency Action File (EAF) which details specific actions to transition from peace to wartime operations. For maintenance organizations, this transition includes dispersing and sheltering assets, generating aircraft, and fine-tuning the command and control functions. The distinction between centralized versus decentralized command and control becomes evident in these three areas. The following comparisons represent inputs from five different wings in USAFE which maintain F4, F15, F16, and F111 aircraft.

Asset Dispersal and Sheltering

Protecting critical assets becomes an immediate requirement during an increase in tension. All wings have plans to disperse and shelter assets such as people, AGE, engines, vehicles, and facilities. The control of these assets is usually decentralized to the AMU level. The supervisors in the AMU become responsible for providing hardened facilities, placing the assets where their use will be maximized, and tracking the status of assets. This status is usually not channeled up unless shortages occur or when assets are damaged or destroyed. The wartime procedures to control these particular assets are easy to adapt to because they are managed daily at the AMU level. Most decision makers agree the lowest level of decision making should be used to control these assets. However, there is some conflict in decentralizing control of other assets which are centrally managed on a day-to-day basis. In particular, fuels and munitions management vary among bases. On three bases, the fuel priorities are decided at the AMU level (21:--; 22:--; 26:--). These units have decentralized fuel control dispatchers located in the AMU or roving on the flight line in coordination with the production superintendent. On other bases, the fuel requests go through the centralized MOC to a centralized fuels control center (FCC) (24:--; 27:--). Munitions control also varies from base to base. Again, three bases have a munitions expediter at the AMU level taking direction from the production superintendent regarding resupply and movement (21:--, 22:--, 26:--). Other bases use the MOC to direct munitions movement from the storage area to the flight line. In all cases, decentralization works only until shortages of assets occur. When this happens, control becomes centralized, usually in the MOC, and decision making at a higher level takes place. As one maintenance officer succinctly put it, "our philosophy is to let the people who do it on a day to day basis be the people who make the decision in the wartime environment" (21:--).

Aircraft Generation

The procedures which govern generation of aircraft are sometimes controversial. Even though MCR 66-5 espouses a decentralized maintenance philosophy, it allows for centralized control during increased periods of activity. Paragraph 3-3 of MCR 66-5 states "during periods of increased activity such as contingencies, emergencies, special tasking or generation exercises, positive direction is exercised by the MOC" (13:3-3). In Chapter 28 to MCR 66-5, the USAFE guidance also declares a centralized philosophy. Paragraph 1-14a states "the MOC is not normally directive in nature unless required by multi-squadron events (generations)" (13:28-2). Chapter 28 also amended the basic guidance in paragraph 3-3 to read "during periods of contingency tasking (exercises or actual), the MOC assumes increased responsibility for coordination. Command and control is exercised by the battle staff through the MOC during these periods" (13:28-5). In practice, however, the decision making for generation of aircraft usually occurs at the AMU level. Production superintendents at three bases select aircraft and determine the generation sequence (22:--; 26:--; 27:--). At the other two bases, the MOC becomes the deciding agency. In all cases, the MOC becomes a central point for requests to external support agencies such as fuels or munitions. This centralization helps keep the resources balanced and evens out the generation flow among AMUs. Another MOC responsibility includes tracking the sequence of actions and channeling information upward to the WOC. Of all the actions which take place during wartime, the generation of aircraft is usually the most centralized in decision making.

Command and Control

During the generation phase, the bases will be establishing their wartime command and control structure. This entails activating the WOC, positioning the MOC, and establishing the AMU and TFS interfaces. Figure 4 (5:26) is a simplified diagram of how the WOC fits into the overall NATO command and control functions. The WOC activation involves implementing the battle staff and survival recovery center, and relocating other support agencies. The

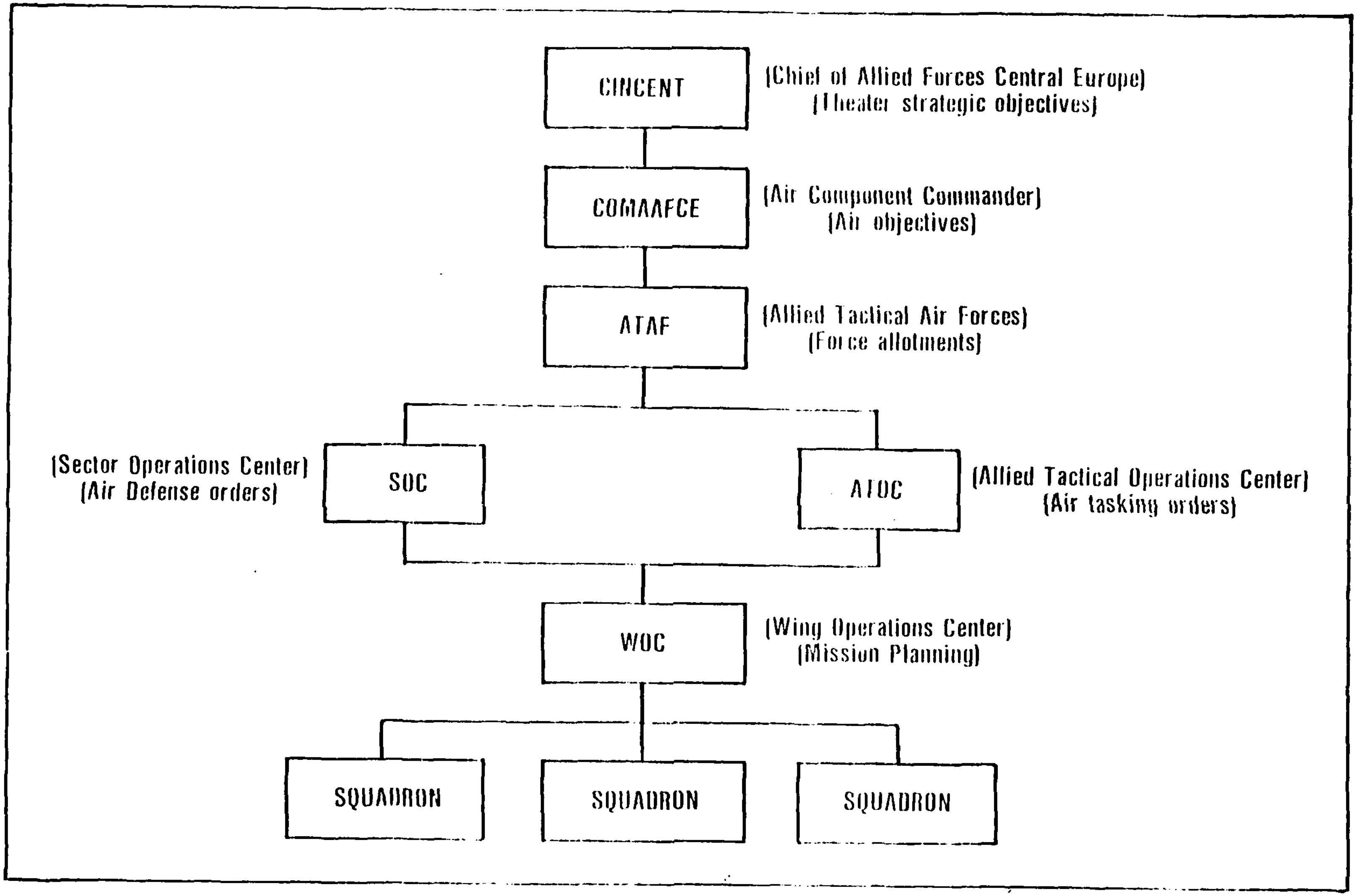


Figure 4. NATO Command and Control Structure
Source: Clifford Krieger, Air Power Journal Summer 1987

location of MOC personnel varies from base to base. These variations may sometimes contribute to them executing more control if they are consolidated. Among the different tactical wings, the MOC primarily operates from one of three separate locations: consolidated in the WOC (27:--), consolidated in their peacetime facility (21:--; 24:--), or dispersed into AMU/TFS facilities (22:--; 26:--). In most cases, wings also have secondary and tertiary back-up capabilities in case the primary control is destroyed. The flight line maintenance and operations squadron interfaces also vary. Some bases collocate an AMU officer or senior NCO in the operations facility (22:--; 26:--), others have senior AMU people in vehicles with an operations director (24:--), and others make periodic contact (27:--). All the bases stress decentralized control at the AMU level. In the words of a former F4 assistant DCM operating at a NATO base, "Having a strong, independent AMU. . . [with] aggressive, well trained personnel. . . is the key to winning the war" (19:--).

DEPLOY TO AN EXISTING BASE

Because of mobilization and long distances, those units which relocate to the NATO theater have more complex actions prior to their transition to a wartime mode. AFLMC's Project Relook summarizes the transition by recognizing that "the increased activity, change of environment, and fluctuating base population will require the deploying unit to perform at maximum capability as quickly as possible after arriving at the deployed location" (17:16). The assistant DCM at a CONUS base admits that wartime command and control "questions have been discussed, argued, and amended many times" (25:--). The command guidance in USAFER 60-6 provides a flexible framework for deploying units to develop procedures to integrate with their host base. The regulation requires "augmentation forces [to] ensure their combat sortie generation procedures are compatible with procedures of their planned beddown base" (12:6-1, para 6-1c[2]). No matter what procedures are used, the CONUS units agree that the "flight line situation is so dynamic that to be the most efficient, it needs to be run by an on-scene person--that is the production superintendent" (25:--). The functions and locations of the WOC and MOC are similar and in many cases, integrated with the host. "In the WOC, the battle staff provides advice, recommendations, options to the wing commander. . . [but] there is a tendency for the battle staff to require too much information, which, once armed with that information, it feels obligated to use and act upon it" (25:--). In two out of three cases, the MOC is separated from the WOC but collocated with the host base MOC. The degree to which AMUs and TFSs work with each other is even closer than in units which fight in-place--probably because they share common facilities. For example, one unit considers its AMU and TFS as "the combat unit during wartime scenarios" and as such, deploys them as a "separate entity" (20:--). The AMU officer and NCOs are "the key combat supervisors of the wing. They make the minute-to-minute decisions on aircraft turns, priorities, and flow. . . whether it be generation prior to deployment or combat turning and repairing aircraft for combat sorties" (20:--).

DISPERSED OPERATIONS

Deploying to a dispersed location usually employs the maximum decentralization. The two scenarios which dictate dispersed operations are the stateside units which relocate to a NATO location where assets are prepositioned, or the fight-in-place units which disperse when their home bases are threatened or destroyed.

Stateside Units

The stateside units which deploy to a prepositioned site operate from collocated operating bases (COBs). The bases provide bare essential facilities, and assets have been previously prepositioned. But because they are not usually collocated with other US forces, their operations can become separated from more complex command and control organizations. These units have a high potential of becoming isolated if communication lines or transportation routes are broken. Decision making then happens at the lowest level. As one unit describes it, "the tactical fighter squadron and AMU work hand-in-glove. Maintenance operations center for the AMU and the operations center for the TFS are located together" (23:--). Furthermore, in these cases, "the Detachment Commander is the ultimate decision maker" (23:--).

Fight-In-Place

The second scenario where a NATO unit deploys forward from its home base may also be COB supported or possibly a base where assets are not prepositioned. Here too, the deployed unit becomes self-reliant and operates independently. USAFER 60-6 provides the following guidance to these units: "USAFE units tasked to deploy and/or host forces [at a] forward operating base (FOB), main operating base (MOB), or collocated operating base (COB) will ensure their procedures are compatible with the host base and/or deployed forces" (12:6-1, para 6-1c[1]). The ability to respond to home base command and control depends on communication and transportation lines.

SUMMARY

Aircraft maintenance command and control philosophies remain the same whether a tactical unit fighting a war in the European environment is fighting in-place, deploying from a stateside base to an existing base, or deploying to a dispersed operation. Decision making is driven to the lowest level when units work to disperse and protect their assets, generate aircraft, and establish command and control functions. Each of the situtations vary in their mode of operation as evidenced by the differences in WOC, MOC, and AMU/TFS interfaces. However, all the individuals responding to the author's questions about decision making agree on one thing--decentralized control works. Only when assets are critical or shortages occur is a higher level decision needed to align resources against needs. In spite of the variations in the way each base operates, the general philosophy is centralized command and decentralized execution or control.

Chapter Four

HOW DO CENTRALIZED VERSUS DECENTRALIZED COMMAND AND CONTROL STRUCTURES IMPACT DECISION MAKING?

Having established a basic knowledge of what resources are controlled, who the decision makers are, and when decision making occurs, now is the time to look at how all these factors tie together. How do variations in the resources, people, and scenarios affect the accuracy and timeliness of decision making? This chapter gives a general overview of the advantages of centralized and decentralized decision making in wartime tactical aircraft maintenance. Three principles help in this discussion: the decisions, the decision makers, and the information flow.

CENTRALIZED DECISION MAKING

Centralized decision making has received bad press recently. However, in all fairness to its positive aspects, centralized decision making does have some advantages. In aircraft maintenance, there are certain decisions and situations where centralized control is quicker or more effective. Using the previous discussions of the resources, people, and information involved in producing sorties, the next paragraphs look at how they may be impacted by centralized control.

Decisions about Resource Allocation

All 10 of the assets discussed in Chapter Two could benefit from centralized control. The circumstances which would make centralized control more effective could be caused by critical shortages, over-extended capabilities, or "big picture" management. In the case of critical shortages, if the people, AGE, supply parts, or vehicles in one AMU were destroyed or damaged, the decision regarding reallocation of the same assets from another AMU must come from a higher source. Usually these situations require intervention by the maintenance squadron commander, the MOC, or the DCM. For example, Spangdahlem AB procedures regarding AGE shortages are typical of most other units in that, the "MOC prioritizes when equipment is 'lost' and constantly arbitrates assignment of critical pieces" (26:--). By the same token, RAF Lakenheath deals with supply shortages using similar guidelines, specifically, "the MOC decides who gets spare parts if more than one aircraft is MICAP [not mission capable for lack of supply part]" (21:--). In dealing with an over extension of capabilities, such as when more aircraft need fuel, munitions, or sheltering than is physically possible, a higher level "makes decisions on wing resources shared among the AMUs and how the complex will respond to real world/exercise inputs" (21:--). Fuel allocation usually becomes the most strained capability during an ICT. Zweibruecken AB is typical in their management of this asset as "POL [petroleum, oil, lubricants] priorities are set by MOC" (24:--). Regarding munitions decisions, RAF Lakenheath finds "the only time the wing commander or DCM are visible is if there is a problem with the munitions. . . determination of fuse settings, and generally which munitions will be expended first" (21:--). Sometimes managing the "big picture" requires centralized decision making. This happens when decisions must be made quickly without having time to consult all the parties, or when information regarding the situation is not releasable to everyone. As one unit discovered, at these times "the wing commander and DCM are out. . . monitoring the flow and problem solving. Their role is. . . 'big picture' decision making. The wing commander and DCM have high and very constant visibility. . . and step in very quickly if the decision process is bogging down" (20:--). In particular, decisions regarding ABDR and refueling with hot pits are many times made at this level. RAF Lakenheath reports that "the wing commander and DCM determine the level of [ABDR] fix to be applied" (21:--). Also, in the case of hot pit usage, most bases operate like Hahn AB which responds that "the wing commander decides whether hot pits should be opened. This, of course, is based on mission requirements and threat of enemy attack" (27:--). As the list of assets is considered, there are times when centralized decision making is quicker or more effective. Specifically, this could happen if resources become critical, if capabilities have been exceeded, or if the 'big picture' requires decisions quickly based on limited participation by others.

Decision Makers' Roles

Relating to the four key decision makers described in Chapter Two, the most common occurrences of centralized command and control happen at the DCM or Wg CC level. As the previous paragraph pointed out, certain time sensitive situations require decisions about aircraft maintenance to be made at their level. The advantages derived from doing business this way include the ability to respond quickly and to make sure wing responses are compatible with the overall NATO objectives. When a wing consciously decides to centralize control over certain assets or situations, the Wg CC and DCM structure their staff and procedures similar to the organization shown in Figure 5 (18:6-3). In these cases, their operations centers--WOC for the wing commander and MOC for the DCM--have more authority and become more directive in nature. Decisions are made at this centralized level and passed down to action agencies. In summary, the two biggest advantages in centralizing decision making at the Wg CC or DCM level are quick response and "big picture" integration.

Information Flow

With centralized control, information flow from the flight line up to the command center--WOC or MOC--is more detailed. For maintenance this includes the detailed tracking of aircraft turn times and actions using a worksheet similar to the one used at Spangdahlem AB as shown in Figure 6 (10:G-15-1). This level of detail helps the command center submit the required off-base

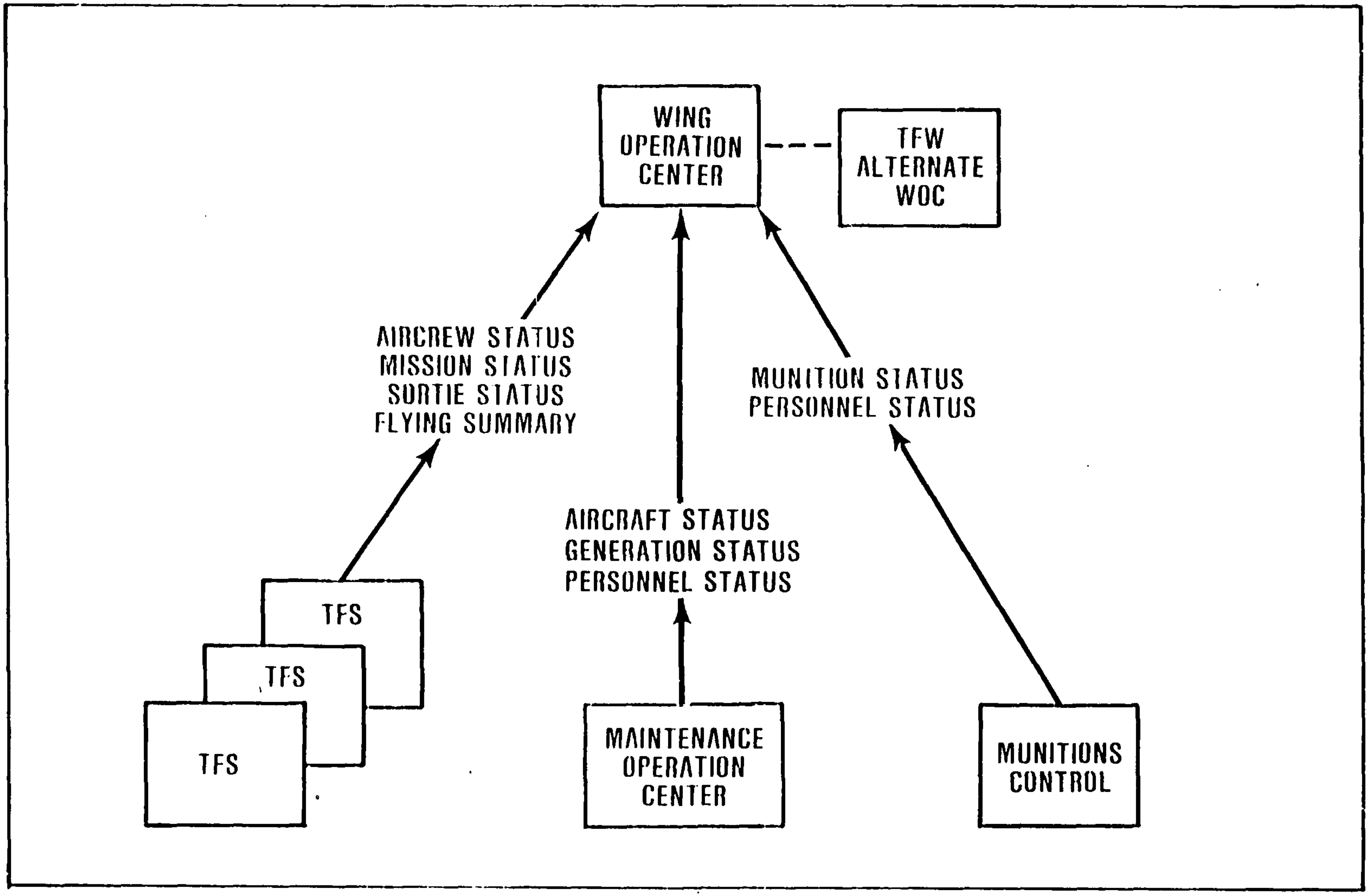


Figure 5. Wing Operations Center Organization
Source: Hahn AB Wing Command and Control Concept of Operations: 30 September 1987

SECRET (WHEN FILLED IN)

LINE	ACFT NUMBER	LOC	T.O. TIME	DEVIATION	REMARKS	LAND TIME	CODE	SYS	FLT TIME	LOC	LOAD START / LOAD STOP	LOAD CREW	CREW READY TIME	ON STATUS (MIKE)	NEXT LINE

SECRET (WHEN FILLED IN)

Figure 6. Integrated Combat Turnaround Worksheet
Source: 52TFW SUPPLAN 4409 (U) 1 October 1985

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reports. Hahn AB provided an excellent summary of the required off-base reports for aircraft maintenance (27:--).

DOPSUM (Daily Operations Summary) - sent daily to HQ USAFE/DO/LG on DD Form 173/2 (Figure 7a/b): provides flying summary by number of sorties, mission effectiveness, and aircraft status.

SORTS (Status of Resources and Training Systems) - sent daily to HQ USAFE/DOCR on USAFE Form 378 (Figure 8): provides support systems status including support equipment and engines (SORTS recently replaced the UNITREP, Unit Status and Identity Report).

SITREP (Situation Report by Wing Commander) - sent daily to HQ USAFE on USAFE Form 315 (Figure 9a/b/c): provides commander's appraisal of current situation.

AIRSTAR (Aircraft Status Report) - sent daily to NATO by computer: provides numbers of mission capable aircraft and those not capable for supply or maintenance. Also includes quantity of attrited aircraft.

Again, if control is centralized in the command centers, these reports become easy to collect, collate, and send to required agencies.

DECENTRALIZED DECISION MAKING

Decentralized operation is the management philosophy for tactical aircraft maintenance as stated in MCR 66-5. The objectives of the Combat Oriented Maintenance Organization are spelled out in the first paragraph of the regulation as a means of providing "a tactical aircraft maintenance support structure with the mobility and flexibility to survive in a dispersed environment and sustain combat operations. . . [with a] decentralized small unit autonomy during dispersed operations" (13:1-1). Using the same criteria for analysis as in the previous discussion on centralization, the next paragraphs look at how resources, people, and information are impacted by decentralized control.

Decisions about Resource Allocation

The assets described in Chapter Two can be very well managed with decentralized control. The people are already organized by AMU in peacetime, requiring minimal impact for transition to war. Since an AMU includes mechanics, avionics, and weapons technicians, very few augmentees are needed to go to war. The advantages gained from this decentralization fit the principle of cohesiveness. Supply representatives also operate in a decentralized mode during peacetime. Under the HQ USAFE program of DASS, the

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BOOK | MESSAGE HANDLING INSTRUCTIONS

NO

FROM 52TFW HAHN AB GE//DOC//

TO USAFE COMMAND CTR RAMSTEIN AB GE//DOCB/LRC/LGMA/LGMP//

INFO HQ 17AF SEMBACH AB GE//DO/LG//

UNCLAS/JOPREP JIFFY

SUBJ: DOPSUM FOR: _____, ___ _____ ______ (_____)

1. SORTIES:

F16C/EDAH/___SD/___AD/___FL/___MT/___GA/___OP/___WX/___YY/___AA/___IFE

F16C/_____/___SD/___AD/___FL/___MT/___GA/___OP/___WX/___YY/___AA/___IFE

F16C/_____/___SD/___AD/___FL/___MT/___GA/___OP/___WX/___YY/___AA/___IFE

F16C/_____/___SD/___AD/___FL/___MT/___GA/___OP/___WX/___YY/___AA/___IFE

F16C/OSTA/___SD/___AD/___FL/___MT/___GA/___OP/___WX/___YY/___AA/___IFE

2. REMARKS:

F-16C/EDAH/____

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F-16C/______/____

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DATE TIME GROUP

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DD FORM 173/2 PREVIOUS EDITION IS OBSOLETE *U.S. GPO 1985-0-481-204

Figure 7a. DD Form 173/2 - Daily Operations Summary (DOPSUM)
Source: USAFER 55-3

JOINT MESSAGEFORM | SECURITY CLASSIFICATION UNCLASSIFIED

PAGE	DATE TIME	MONTH	YR	ACT	INFO	CLASS	SPECAT	LMF	CIC	ORIG MSG IDENT
02 .. 0	Z		87	00	PP	UUUU				DOC L

BOOK: NO

MESSAGE HANDLING INSTRUCTIONS

3. POSSESSED AIRCRAFT:

EDAH/_____/F16C ON STATION

_____/_____/F-16C UTD

_____/_____/F-16C XC

_____/_____/F-16C XC

_____/_____/F-16C __________

_____/_____/F-16C __________

4. WEEKLY FLYING SCHEDULE:____________________//

5. SCHEDULE REMARKS:____________________//

6. OVERALL REMARKS:______________________________

____//

DISTR

DRAFTER TYPED NAME, TITLE, OFFICE SYMBOL, PHONE: SAME AS RELEASER 450-7131

SPECIAL INSTRUCTIONS: THIS MSG IS NOT EFFECTED BY MINIMIZE

RELEASER TYPED NAME, TITLE, OFFICE SYMBOL AND PHONE: DOC

SIGNATURE

SECURITY CLASSIFICATION: UNCLASSIFIED

DATE TIME GROUP: Z 87

DD FORM 173/2 PREVIOUS EDITION IS OBSOLETE U.S. GPO 1985-0-461-294

Figure 7b. DD Form 173/2 - (DOPSUM) Continued

CONFIDENTIAL *(When filled in)*

UNITREP MAINTENANCE REPORTING WORKSHEET | MX STATUS FOR TFS | DATE

NOTE: FOR JCS REASON CODES COORDINATE WITH WING UNITREP MONITOR PRIOR TO SUBMISSION

HOME STATUS

AUTHORIZED	ASSIGNED	POSSESSED	MR NOW	1 MR DOC	2 MR DOC	MR 12 HR	MR 24 HR

DEPLOYED STATUS

AIRCRAFT TYPE	LOCATION	POSSESSED	MR NOW	MR DOC	MR 24 HR

DOC COMPUTATIONS / SPECIAL CAPABILITY STATUS

	PRIMARY DOC	SECONDARY DOC	REQUIRED	FMC
MR ÷ AUTH DOC PCT				
C - RATING				
REASON CODE				
GWO				

AIRCRAFT STATUS

NMCM	NMCS	NMCB	PMCM	PMCS	PMCB	DEPOT

SPARE ENGINE STATUS

ABLE	REQUIRED	PCT AVAILABLE	C - RATING	REASON CODE	GWO

ELECTRONIC COUNTER MEASURES (ECM) POD STATUS

POSSESSED/MR	AUTHORIZED	PCT AVAILABLE	C - RATING	REASON CODE	GWO

POWERED AEROSPACE GROUND EQUIPMENT (AGE)

POSSESSED/MR	AUTHORIZED	PCT AVAILABLE	C - RATING	REASON CODE	GWO

NON - POWERED AEROSPACE GROUND EQUIPMENT (AGE)

POSSESSED/MR	AUTHORIZED	PCT AVAILABLE	C - RATING	REASON CODE	GWO

TEST EQUIPMENT

POSSESSED/MR	AUTHORIZED	PCT AVAILABLE	C - RATING	REASON CODE	GWO

REMARKS

PRINTED NAME OF MAINTENANCE CONTROL OFFICER	SIGNATURE

USAFE FORM 378 SEP 84 REPLACES PREVIOUS EDITIONS OF USAFE FORMS 167 DEC 80 378 TEST DEC 82 CLASSIFIED BY: AFR 55 - 15 DECLASSIFY ON: OADR *(When filled in)* CONFIDENTIAL

Figure 8. USAFE FORM 378 -- Status of Resources and Training System Report (SORTS) AFR 55-15

CONTROLLER CHECKLIST/MESSAGE FORMAT	[illegible] Commander's SITREP

Title: Commander's SITREP Worksheet

1. (U) THIS REPORT REPRESENTS THE COMMANDER'S VIEW OF THE UNIT'S CAPABILITY. INDIVIDUAL ACTION OFFICES WILL BE RESPONSIBLE FOR THEIR INFORMATION. THIS REPORT WILL BE "AS OF" [illegible] AND DUE TO THE REPORTS CELL NO LATER THAN [illegible].

2. (U) THE REPORT WILL HAVE ASSIGNED PARAGRAPHS AS SHOWN BELOW. IF AN AREA HAS NO INPUTS, THE LETTER DESIGNATOR SHOULD BE LISTED WITH A "NEGATIVE INPUT".

A. OPERATIONS.

B. MAINTENANCE AND MUNITIONS.

C. RESOURCES (SUPPLY, TRANSPORTATION, CONTRACTING, [illegible]).

D. INTELLIGENCE.

E. MEDICAL.

(1) CASUALTIES. FORMAT: TOTAL TO DATE CURRENT DAY EVACUATED/RETURNED TO DUTY TOTAL.

(2) NARRATIVE REMARKS. INCLUDE COMMENTS REGARDING:

(A) ADEQUACY OF HOUSING, LATRINES, SEWAGE DISPOSAL, DINING FACILITIES AND PORTABLE WATER SUPPLY.

(B) ANY OUTBREAK OF GASTROINTESTINAL OR RESPIRATORY DISEASE.

(C) UNIT WORKLOAD (PATIENTS SEEN THIS DAY/TOTAL TO DATE). CHANGES IN OPERATING STATUS AND PERSONNEL OR MATERIAL SHORTAGES WHICH ADVERSELY AFFECT MISSION ACCOMPLISHMENT.

F. SECURITY.

G. COMMUNICATIONS.

H. CIVIL ENGINEERING.

I. PERSONNEL.

(1) CASUALTIES: (LAST 24 HOURS/SINCE LAST REPORT)

KIA ( ) WIA ( ) PW ( ) DNBI ( ) ADMIN ( ) TOTAL ( )

HQ USE ONLY		UNIT USE ONLY		OPR
DATE	PAGE OF PAGES	DATE	PAGE OF PAGES	

USAFE FORM JUL 80 315 — STAMP SECURITY CLASSIFICATION HERE

Figure 9a. USAFE Form 315 - Situation Report by Wing Commander (SITREP) USAFER 55-16

STAMP SECURITY CLASSIFICATION HERE

CONTROLLER CHECKLIST/MESSAGE FORMAT

IDENTIFIER

Commander's SITREP

TITLE

Commander's SITREP Worksheet

CASUALTY NARRATIVE SUMMARY (REQUIRED):

(A) EXPLAIN OR AMPLIFY REPORTED DATA BY CITING EVENTS WHICH RESULTED IN SIGNIFICANT CASUALTIES. COMMENT REGARDING THE IMPACT OF CASUALTIES UPON THE INSTALLATION'S MISSION CAPABILITY.

(B) REPORT KEY LOSSES: E.G., US GENERAL FLAG OFFICERS AND/OR MISSION CAPABILITY.

(C) EXPLAIN IMPACT OF NONBATTLE CASUALTIES ON THE INSTALLATION'S MISSION CAPABILITY. INDICATE IF THE REPORTED NONBATTLE FIGURES EXCEED THE PROJECTED PLANNING ESTIMATES. INCLUDE KEY NONBATTLE LOSSES AND THEIR IMPACT. INCLUDE AFSC DETAIL.

(4) STRENGTH DATA.

(A) ASSIGNED.

(B) AUTHORIZED.

(C) GAINS LAST 24 HRS (SINCE LAST REPORT).

(D) LOSSES LAST 24 HRS (SINCE LAST REPORT).

(E) NARRATIVE (REQUIRED) COMMENT ON COURSE OF GAINS (I.E. REPLACEMENTS, RETURNED TO DUTY, ADDITIONAL UNITS, AUGMENTEES TFFL FORCES).

J. SERVICES (BILLETING, MORTUARY, DINING).

K. DATA AUTOMATION:

L. COMMANDER. UNIT COMMANDER'S OVERALL ASSESSMENT OF THE UNIT'S CAPABILITY. THIS IS THE COMMANDER'S PARAGRAPH TO HIGHLIGHT SIGNIFICANT SHORTFALLS THAT MAY AFFECT THE UNIT'S ABILITY TO PERFORM ITS PRESCRIBED MISSION(S).

3. (U) INPUTS MUST BE RECEIVED BY THE REPORTS CELL NO LATER THAN 1830Z, ON THE ATTACHED PAGE.

HQ USE ONLY			UNIT USE ONLY			OPR
DATE	PAGE OF PAGES		DATE	PAGE OF PAGES		

USAFE FORM JUL 80 315

STAMP SECURITY CLASSIFICATION HERE

Figure 9b. USAFE Form 315 - (SITREP) Continued

CONTROLLER CHECKLIST/MESSAGE FORMAT	Commander's SITREP

TITLE
Commander's SITREP Worksheet

4. ( ) COMMANDER'S COMMENTS: ______________________________

5. ( ) PROBLEM AREAS: ______________________________

HQ USE ONLY			UNIT USE ONLY			OPR
DATE	PAGE OF PAGES		DATE	PAGE OF PAGES		

USAFE FORM JUL 80 315 STAMP SECURITY CLASSIFICATION HERE

Figure 9c. USAFE Form 315 - (SITREP) Continued people, assets, and lines of communication (computer) are collocated with the AMU. Doing business this way reduces response time for parts to reach the technician. The management of fuel support still varies among the different tactical wings. At Bitburg AB, the author worked in an environment where POL supervisors were dispersed into the AMU and coordinated with the production superintendent to establish priorities for fuel dispatches. This procedure kept aircraft refueling operations moving smoothly. With support equipment, the assets are assigned to AMUs and the AGE drivers work directly with the production superintendent to move resources when and where needed. Again, response time is very quick. Management of HAS facilities is another resource which different bases treat with varying procedures. In most units, there is a concentrated effort to allow AMU/TFS decentralized decisions regarding use of HASs. Allowing the AMU/TFS to make this decision is most appropriate because they are in the best position to see the flight line. They know where the available HASs are located and whether the taxiways are clear from craters or other damage. Procedures to allocate munitions also vary from base to base. In decentralized operations, munitions expeditors are assigned to the AMU, and they call directly to delivery crews for resupply. This procedure saves time by eliminating an extra transmission to a third agency for requests. For both communications and transportation, decentralization means the ability to best control radios and vehicles at a level where the assets are most visible. In generating sorties, decentralization puts the decision making at the AMU/TFS level. The AMU decides aircraft ICT priorities and matches resources to the requirement. With the TFS providing operations inputs, this concept works efficiently because the decisions are made at the level where resources are available. This same efficiency is also apparent with decision making regarding repair actions such as ABDR. When this function is decentralized, the AMU and EMS, who usually is the program manager for ABDR, work together to establish priority actions and align resources. In all the resource allocation decisions, decentralized control results in faster response time since the assets are directly available to the area which has the requirement. Having this direct control cuts the "middle man" out of the loop, thus saving time.

Decision Makers' Roles

When decision making is decentralized, the production superintendent and OIC become the key players. With the high number of activities going on, the flight line pace is extremely hectic. These supervisors must have well established procedures and well trained people. USAFE bases have wing plans which detail responsibilities. One such plan is Spangdahlem AB Supplemental Plan (SUPPLAN) 4409. This plan, and others like it, outline supervisory roles for tasks such as sheltering and dispersal of assets, HAS door operations, aircraft status codes, ICT data flow, supply delivery locations, protection of aircraft, and sortie generation procedures (10:--). This last area, combat sortie generation, forms the core of flight line activities. In Spangdahlem's Annex D to SUPPLAN 4409, there is a six-page instructional tab to an appendix which defines the roles of the AMU supervisors (10:G-15-1). Although there are 10 specific tasks assigned to the OIC/production superintendent, the first duty listed sets the tone: "overall control of entire AMU maintenance effort" (10:G-15-3, para 3c[2]). However, the unwritten responsibility of the OIC and production superintendent is probably most important of all. They must know their AMU capabilities and not hesitate to elevate problems when these capabilities have been exceeded.

Information Flow

When sortie generation and resource management decisions are decentralized, the information flow to the WOC and MOC becomes less detailed. Most bases have representatives in the command centers with radio contact to the flight line, but they remain in a listening mode. This way the operation centers can indirectly gain information to track the status, monitor the activities, and provide back-up command and control if the primary source is destroyed or damaged. Status reports and detailed summaries are usually provided by the AMU at the end of the day to the MOC or WOC for off-base reporting. The Worldwide Military Command and Control System (WWMCCS) is currently operational at many bases in Europe, and others are scheduled for implementation. This computer system "provides the means for operational direction and technical administrative support involved in the function of the command and control of US military forces" (16:41-4). WWMCCS is fast becoming the primary means for transmitting information and receiving direction to and from unified and specified commands, the JCS, and the National Command Authority (NCA).

SUMMARY

This chapter looked at the advantages of both centralized and decentralized control for aircraft maintenance. Although there are certain times and situations where centralized control proves advantageous, the majority of flight line decision making remains decentralized at the AMU/TFS level. Centralized control may be necessary in those cases where resources are short, capabilities have been exceeded, or if the Wg CC/DCM have information they may not be free to publicize. For virtually all other situations, decentralized control is more effective because it is quicker and matches the resources to the requirements.

Chapter Five

CONCLUSIONS AND RECOMMENDATIONS

How do these resources, people, situations, and ideas fit together? This chapter will draw together the conclusions of the previous chapters and offer two recommendations for future discussion. The problem presented in Chapter One asked if a model could be developed for command and control of aircraft maintenance in a tactical, wartime, European scenario. In the conclusion of this chapter, the author will present an open ended model which could be used "as is" or altered with options to fit specific circumstances. Next, this chapter introduces two recommendations which may be part of future exercises matching wartime requirements against capabilities.

THE CONCLUDING MODEL

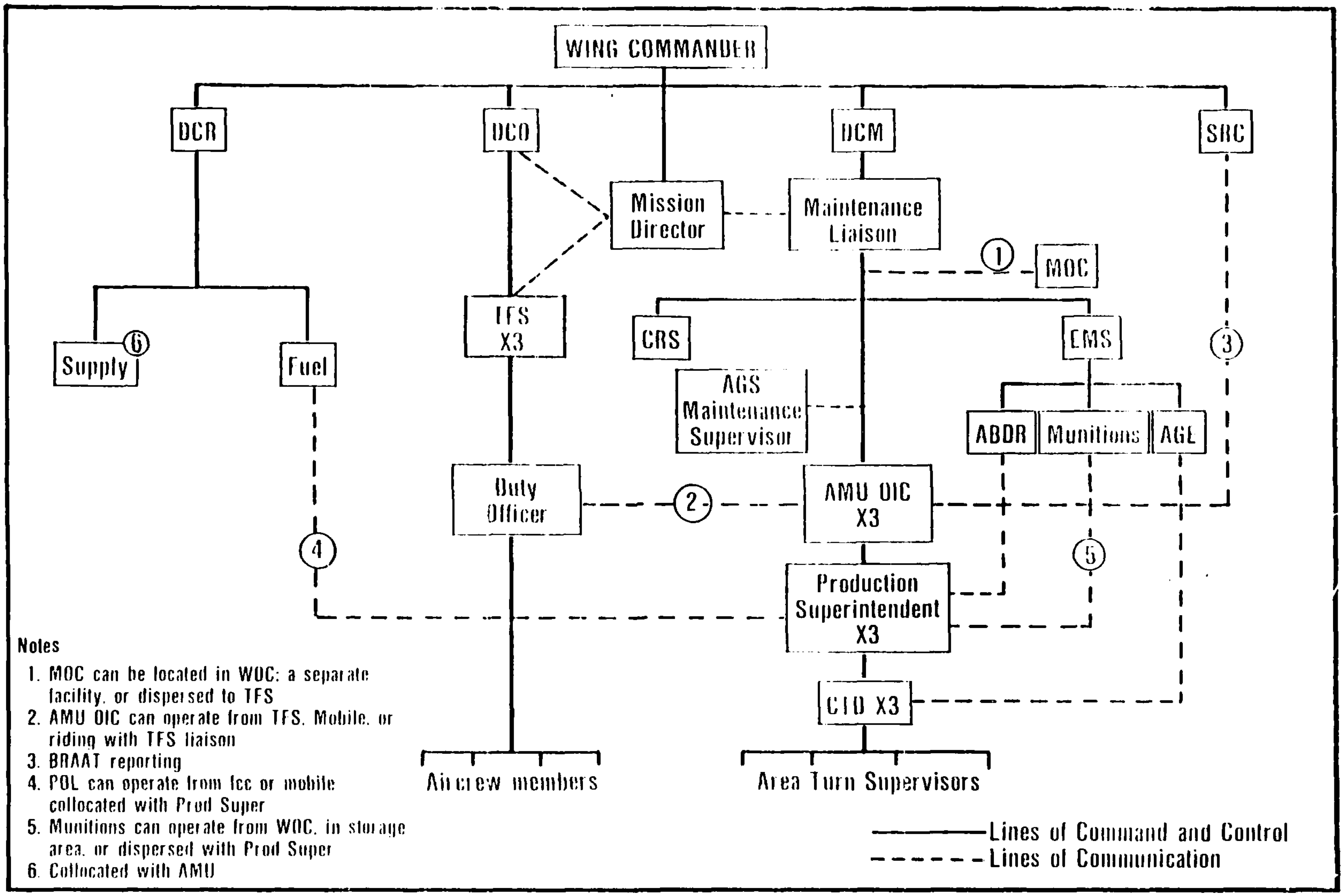
To solve the problems associated with decision making in a wartime, tactical, European environment, a unit must have a command and control system which is simple, flexible, and effective. Such a system must be capable of putting "the right data in front of the right commander at the right time to influence his decision process" (16:41-10). Specifically, the organization must, as simply as possible, define the roles of the key decision makers including, but not limited to, the production superintendent, maintenance officer-in-charge, deputy commander for maintenance, and wing commander. Their roles are critical to the orchestration of the flight line activities involving people, supply, fuels, support equipment, facilities, munitions, communications, transportation, sortie generation, and repair actions. As Chapter Two related, well developed, yet simple command and control procedures between these activities and the decision makers are keys to successful wartime operations. A flexible structure should provide enough guidance to adapt a peacetime chain of command to wartime scenarios for units fighting in-place, deploying to existing bases, or dispersing to autonomous operating locations. Chapter Three showed how each of these scenarios require units to make adjustments in their operations. The effectiveness of an organization is greatly impacted by the degree of decentralization given to maintenance decision making. In Chapter Four, the advantages of both centralized and decentralized decision making were discussed and a final summary concluded that decentralization is most effective. A simple, flexible, and effective command and control model would have to safisfy those requirements discussed in the first four chapters of this study and ultimately provide the wing commander with sufficient firepower to win the battle.

In tying these resources, people, and situations together, MCR 66-5 and USAFER 60-6 espouse the philosophy of decentralized execution, but retention of enough centralized command authority to oversee results and resolve conflicts (12:--; 13:--). The model at Figure 10 represents a composite of ideas collected from Nellis AFB which deploys overseas to both a MOB and COB, and from Zweibruecken, Hahn, and Bitburg ABs which fight in-place in Germany (20:--; 22:--; 24:--; 27:--). Any tactical unit could adapt to this model or, as the Notes 1-6 indicate, different options can alter the organization to fit the circumstances. The design is simple enough to allow the lowest level to make the detailed decisions for sortie generation, while leaving the battle staff free to concentrate on the overall command of the wing. Because it places the production resources and people at the lowest level, it is also flexible enough to allow autonomous operations if the AMU/TFS becomes isolated from battle staff command and control. Additionally, all units have alternate command structures duplicated at levels from the battle staff down to the area turn supervisors. These back-up functions continually monitor activities and are capable of instantly taking over should the primary functions become inoperable. This capability provides increased flexibility. The model also allows for a unit to determine the desired balance of decentralization. As discussed in Chapter Four, there may be times when centralized decision making is appropriate. When required, the MOC, acting as the DCM's representative, may regain control of the assets. However, most of the time, control of sortie generation remains decentralized to the AMU/TFS level. The model at Figure 10 provides an overview of the relative positions of the decision makers and shows how they coordinate with lateral functions to control maintenance activities. As a model, it can easily be adapted for use at any tactical, European unit operating in a wartime environment.

RECOMMENDATIONS FOR THE FUTURE

For the past 10 years, tactical aircraft maintenance philosophies have undergone radical changes to build organizations which are effective and survivable under wartime conditions. What's left for the future is a program to fine-tune the basics and practice applying them. This study adds two more recommendations to the list of ongoing projects which are designed to make the maintenance organizations run smoother. The first of these recommendations is to change MCR 66-5 to discuss the wartime chain of command using a model similar to the one presented here. The second recommendation is to develop a more realistic exercise scenario which tasks a unit's sustainability beyond the initial phases of a war.

After 10 years of revisions, MCR 66-5 is a widely respected regulation by which all tactical units structure their maintenance organizations. Its intent is to build a maintenance organization which functions in war much the same as it does in peace. However, the regulation also covers a variety of unique peacetime requirements such quality assurance programs, scheduling coordination procedures, and training management (13:--). Conversely, there are certain activities and events which exist in wartime operations but not peacetime. These include battle staff/WOC procedures, SRC and BRAAT operations, AMU/TFS liaison techniques, ICT conflicts, and in general coping



Notes

1. MOC can be located in WOC: a separate facility, or dispersed to TFS
2. AMU OIC can operate from TFS, Mobile, or riding with TFS liaison
3. BRAAT reporting
4. POL can operate from fcc or mobile collocated with Prod Super
5. Munitions can operate from WOC, in storage area, or dispersed with Prod Super
6. Collocated with AMU

Figure 10. Wing Wartime Command and Control Organization
Source: Multiple

with the pressures and pace of wartime conditions. In these areas, MCR 66-5 leaves much of the detail planning to major commands and units for them to adapt their peacetime command and control into a wartime function. The recommendation of this study is to include in MCR 66-5 some general guidelines regarding command and control options in a wartime scenario. These procedures should not be so detailed they restrict individual units from designing a structure to fit their particular situation, but they should provide a framework to the units. Using a model similar to the one presented in this chapter would supplement the organizational charts already presented in Chapter One of the regulation. The first recommendation from this study is that MCR 66-5 should include a brief description of what to expect in wartime, and present a few options to establish simple, flexible command and control interfaces to effectively conduct tactical aircraft maintenance in a wartime environment.

The second recommendation may be more difficult to accomplish. It deals with building exercise scenarios which task units to practice long term sustainability. Currently, units in USAFE exercise their capability to criteria defined by the NATO Tactical Evaluation inspection system. This entails a three-day exercise which realistically tests the wing's initial response to a concentrated enemy campaign against the airbase. However, what the exercises fail to evaluate is the wing's ability to sustain long term operations. This limitation conceals the effect of attrition on people, equipment, spare parts, and replenishment assets. Additionally, communication and transportation avenues may be severely hampered during the longer phases of war. Command and control may also be seriously disrupted, particularly if the primary decision makers become casualties. The result is that units may develop a false sense of security thinking they know how to deal with adversity, when all they are doing is reacting to a compressed version of a protracted war. The second recommendation of this study is to find a way to build exercise scenarios which realistically test a wing's capability to endure long term impacts. For example, eliminate some of the key players and not revive them. Simulate a 33 percent casualty rate among maintenance technicians. Then simulate a delay of augmentee forces, or even a situation where they do not arrive because airlift or sealift has been disrupted. Induce fatigue factors after these hardships. Practice survival after the 20-day point where spare parts, POL, and follow-on assets fail to arrive due to transportation problems. Study communication outages when equipment is damaged, destroyed, or continually jammed by the enemy. Salty Demo attempted to test these parameters and found some glaring shortfalls in sustainability. Wings need more realism and techniques similar to Salty Demo's test criteria.

SUMMARY

This chapter offers one conclusion and two recommendations which summarize the results of this study. The analysis looked at the decision makers, the assets, the scenarios, and the impacts of different decision making structures to answer the questions of who, what, when, and how. The final result concluded that a command and control structure for a tactical, European wartime environment must be simple, flexible, and effective. The proposed model fits this criteria. It includes the key decision makers and shows their interfaces, both through direct communication and coordination channels. Through these chains, this model provides the framework for controlling the critical assets and activities on the flight line. The model is also flexible enough to be used by fight-in-place units, those units deploying from CONUS, and those dispersing to other locations. The model is geared to support decentralized operations, but leaves room for centralized control, if necessary. Out of this conclusion which presented a model for aircraft maintenance wartime command and control comes two recommendations. First, since MCR 66-5 is known as the authoritative guidance for tactical aircraft maintenance procedures, then this model should be included in the regulation. Expanding the guidance for wartime operations in MCR 66-5 would provide supervisors and commanders with standardized options for employment. This could be the foundation for incorporating other major command regulations such as USAFER 60-6 and various operational plans like OPLANs 4102 and 4409. The second recommendation--realistic exercises and training--would help to better prepare supervisors, commanders, and troops. As time goes by and we have fewer and fewer people with combat experience in key decison making roles, we get closer and closer to exposing our vulnerabilities--in this case, sustainability. The solution then is to train, practice, and inspect the capability to endure in a longer-lasting wartime environment.

The key element to survival in a tactical, wartime European environment is a simple, flexible, effective command and control structure. This study analyzed the factors in the European environment and described the who--decision makers; the what--assets; the when--fight-in-place, deployed, dispersed; and the how--centralized versus decentralized command and control. The observations are not surprising, but perhaps a reminder that the better prepared, better trained, and better organized unit will win.

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GLOSSARY

AB	Air Base
ABDR	Aircraft Battle Damage Repair
ACSC	Air Command and Staff College
AFB	Air Force Base
AFLMC	Air Force Logistics Management Center
AFR	Air Force Regulation
AGE	Aerospace Ground Equipment
AGS	Aircraft Generation Squadron
AMU	Aircraft Maintenance Unit
ATAF	Allied Tactical Air Forces
ATOC	Allied Tactical Operations Center
BRAAT	Base Recovery After Attack
C3	Command, Control, and Communications
CE	Civil Engineers
CINCENT	Chief of Allied Forces Central Europe
COB	Collocated Operating Base
COMAAFCE	Commander Allied Air Forces, Central Europe
[illegible]	Combat Oriented Maintenance Organization
[illegible]	Communications Security
[illegible]	Continental United States
[illegible]	Component Repair Squadron
CTA	Combat Turn Area
CTD	Combat Turn Director
DASS	Dedicated Aircraft Supply Support
DCM	Deputy Commander for Maintenance
DCO	Deputy Commander for Operations
DCR	Deputy Commander for Resources
EAF	Emergency Action File
EMS	Equipment Maintenance Squadron
FCC	Fuels Control Center
FOB	Forward Operating Base
HAS	Hardened Aircraft Shelter
HQ TAC	Headquarters, Tactical Air Command
HQ USAFE	Headquarters, United States Air Forces Europe
ICT	Integrated Combat Turnaround
JCS	Joint Chiefs of Staff
MCR	Multiple Command Regulation
MICAP	Mission Capability
MOB	Main Operating Base
MOC	Maintenance Operations Center
NATO	North Atlantic Treaty Organization
NCA	National Command Authority
NCO	Non-Commissioned Officer
OIC	Officer-In-Charge
OMS	Organizational Maintenance Squadron
OPLAN	Operational Plan
POL	Petroleum, Oil, Lubricants
RAF	Royal Air Force

CONTINUED

SOC..........................	Sector Operations Center
SRC..........................	Survival Recovery Center
SUPPLAN......................	Supplemental Plan
TFS..........................	Tactical Fighter Squadron
TFW..........................	Tactical Fighter Wing
USAFER.......................	USAFE Regulation
WG CC........................	Wing Commander
WMP..........................	War Mobilization Plan
WOC..........................	Wing Operations Center
WWMCCS.......................	Worldwide Military Command and Control System

APPENDIX

APPENDIX A

SURVEY OF COMMAND AND CONTROL OF TACTICAL, EUROPEAN AIRCRAFT MAINTENANCE

- Do you have a wing or maintenance plan or operating instruction which describes transition to and operations in a wartime mode?
    - --If so, could you send me a copy?
    - --If not, what guidance do you use?

- During wartime scenarios, is your unit:
    - --Fighting in place?
    - --Mobilized and integrated with a pre-existing wing?
    - --Mobilized to a bare base?
    - --Other?

- For each above situation you are involved in, draw a command and control diagram which shows role of:
    - --Battle Staff
        - ---Wing commander
        - ---Deputy Commander for Maintenance
    - --Maintenance Squadron Commanders
    - --Maintenance Operation (Job Control)
    - --Aircraft Maintenance Unit (AMU) Officer
    - --Tactical Fighter Squadron operational interface with AMU
    - --Integrated Combat Turn team concepts

- For the players defined above, elaborate on their role in decision making (what type of decisions, information flow up or down, etc.)
    - --Who makes what decisions?
    - --How is information upchanneled or downchanneled?

- Describe decision making procedures during the generation phase, specifically, are actions controlled by the battle staff, maintenance operations center, or at the squadron/maintenance unit level?

- Do you work in a hardened shelter environment?
    - --If so, how do you manage shelter priorities?
        - ---ie. which shelter(s) receive returning aircraft (is AMU integrity a factor?)
        - ---repair of shelters, interface with Civil Engineers
    - --If not, what decisions are made regarding aircraft parking plan and sheltering of assets?

CONTINUED

- What are your command and control procedures to handle special taskings such as:

--Base Recovery After Attack Reporting (flow of information, timing, who receives information, relationship with Survivability Recovery Center, what mode of transmitting is used ie. telephone, radio, runner)

--Aircraft Battle Damage Recovery

---Who is program manager?

---Where are technicians located in wartime? Who controls dispatches them?

---Information flow (who initiates, where does it go, through what communication system etc.)

--Fuel (POL) priorities

---Who does request go through?

---Are there any flightline dispatchers working directly with AMU or is POL centrally controlled?

---How are shortages managed?

--Munitions

---What are procedures for resupply delivery?

---How is accountability conducted?

---What visibility does wing commander or DCM have?

--Hot Pit management

---Who makes decisions to use pits versus returning to parking?

---If you have pentagraphs in shelters, how are they used?

---Who mans the pits--AFSC, squadron?

--End of Runway management

--Supply support

---Location of assets

---Pick up and delivery

---Repair

--Debrief

---Where are the debriefers located?

---How often is debriefing done ie. end of flying day, every sortie etc.

--Computer support

---How much data is collected in computer versus how much is manual?

--Cross Servicing

---Who manages taskings and monitors priorities?

---What is the information flow?

--Base Denial

---Decision making on establishing priorities

---What agencies are tasked to carry out actions?

--Air Base ground defense

---How much affect do augmentees pulled from maintenance resources have on sortie generation and/or maintenance activities?

---What is the best resource to support these taskings, ie., what is the basis for selecting augmentees?

--AGE movement

---Who prioritizes, moves, services, delivers etc.

CONTINUED

- What are the reporting requirements--both for on-base use and for off-base reporting?
    --Command post reporting
        ---What maintenance data is collected/when and where does it go?
        ---How are shortages ie., personnel, equipment attrition, reported?
    --Off Base reporting
        ---What reports are required/where and when do they go?
        ---Provide copies of reports (not filled in) if possible
        ---Provide references if known

- Describe any other events or circumstances which require aircraft maintenance decision makers to get involved. What level makes decisions and how is information up or down channeled?

END